March 8, 1960 P. A. MAHLER 2,927,447

PATTERN DRUM INDEXING MECHANISM

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FIG. 1.

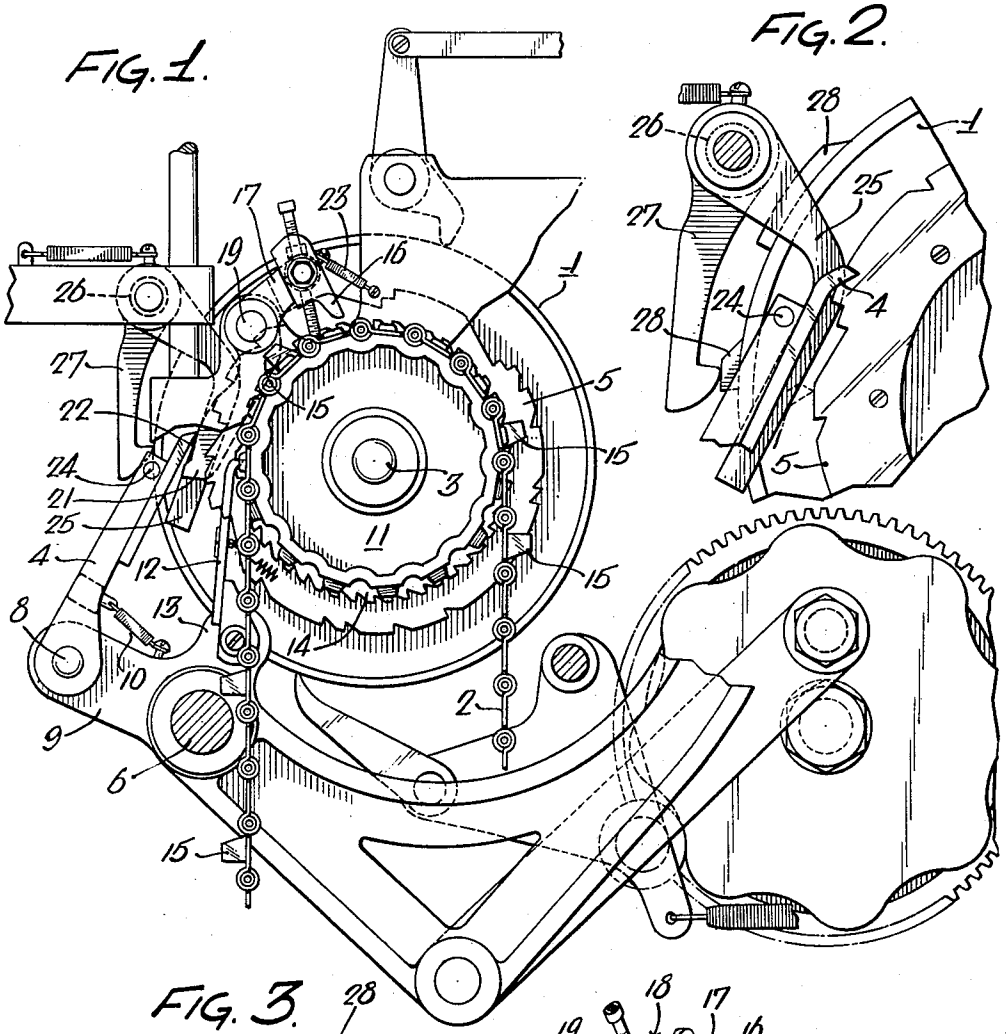
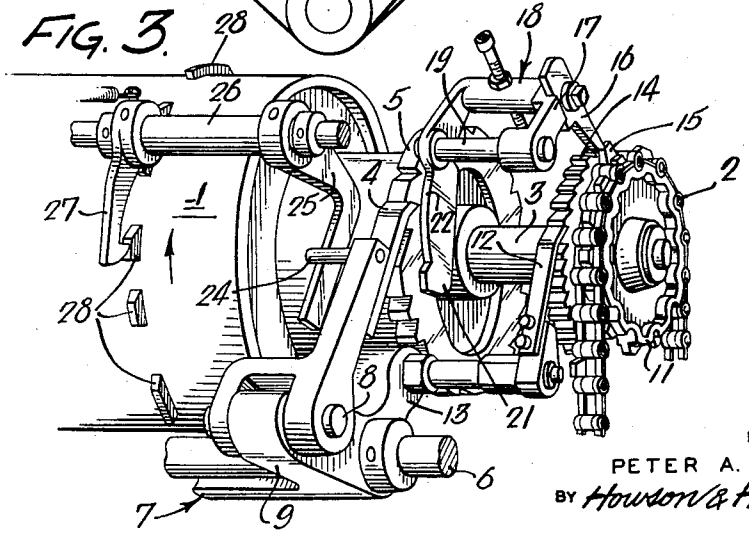


FIG. 2.

FIG. 3.



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PATTERN DRUM INDEXING MECHANISM

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3 Claims. (Cl. 66—154)

This invention relates to improvements in circular knitting machines and more particularly to machines of the type comprising a pattern drum controlling sequential operations of the machine and means for indexing said drum.

A principal object of the invention is to provide improved indexing mechanism for the drum, positive in operation and having a safety factor materially in advance of the prior indexing mechanisms, and better adapted also to the relatively complicated requirements of the modern machine.

A more specific obect is to transfer in substantial part at least the function of the pattern chain conventionally used to control drum indexing to the drum itself thereby to reduce the relatively critical nature of chain controlled indexing and to afford a means for increased flexibility in drum operation.

The invention will be more readily understood by reference to the accompanying drawings, wherein:

Fig. 1 is a more or less schematic fragmentary sectional elevational view of the pattern mechanism of circular hosiery knitting machine made in accordance with the invention;

Fig. 2 is an enlarged fragmentary sectional view showing details of the drum indexing pawl and pawl control elements, and

Fig. 3 is a view in perspective on a reduced scale showing that part of the pattern mechanism with which the invention is primarily concerned and illustrating the details of the latter.

With reference to the drawings, 1 is the pattern drum of a knitting machine of the type to which the present invention pertains, and 2 is the pattern chain which conventionally, and as illustrated for example in prior United States Patent No. 2,422,568, controls the step-by-step rotary movements or indexing of the drum. The drum is mounted on a shaft 3 and its intermittent rotary or indexing movements are effected by a pawl 4 which acts on a ratchet wheel 5 attached to the drum. The pawl is oscillated continuously in predetermined timed relation with the needle cylinder of the machine through a bell crank lever 7 pivotably mounted on a shaft 6 carried in the frame of the machine, the pawl being pivotally attached at 8 to one arm 9 of the lever. A spring 10 tends to hold the pawl in operative engagement with the ratchet wheel but permits retraction of the pawl as described below.

The chain 2 is engaged with a sprocket 11 journalled on the shaft 3, and the sprocket is given a constant intermittent rotary movement by a pawl 12, attached to the arm 13 of the lever 7, and a ratchet wheel 14 secured to the sprocket. As shown in the above-identified patent, the needle cylinder is mounted for rotation and oscillation, and is operated by suitable drive mechanism including the oscillating shaft 6 which also drives the pattern chain in timed relation to the operation of the cylinder through the pawl 12 and the ratchet wheel 14. The chain has lugs 15 which co-act with a finger 16 on one arm 17

of a lever 18, said lever being pivotally mounted on a relatively fixed shaft 19. This lever has an arm 21 which when the lever is rocked from the position shown in Figure 3, as described below, will engage the proximate end of the pawl 4 and will elevate the pawl from the ratchet wheel 5 so that the oscillations of the pawl are inoperative to actuate the said wheel. When so elevated the free end of the pawl will ride on the edge 22 of the arm 21. The arm 21 occupies the retracted position shown in Figure 3, only when the finger 16 is engaged with one of the lugs 15 of the pattern chain, and will occupy the aforesaid elevated pawl-displacing position when not so engaged. A spring 23 exerts pressure tending to resist angular displacement of the lever 17 by the lugs 15.

Insofar as described, the mechanism corresponds essentially to that disclosed in the aforesaid United States patent.

In prior mechanism of this character the arm 21 was formed so that, depending on its position of relative elevation, it could function to elevate the pawl 4 to an extent such that the pawl would have no engagement with the teeth of the ratchet wheel 5 either over the entire or over a selected part only of the forward or working stroke. In this case, elevation of the arm 21 is a function of the height of the actuating lug on the pattern chain, and the differences in the heights of the lugs corresponding to required movements of the drum are frequently so small that the dimensions are critical. Relatively slight wear may result in faulty operation and serious damage to the machine.

In accordance with the present invention, control of the pawl 4 in its relation to the ratchet wheel 5 is in large part removed from the chain 2 and its lugs 15 and imposed upon the pattern drum 1. To this end the pawl is provided with a pin 24 which is operatively related to an arm 25 on a tubular rock shaft 26, the shaft carrying a second arm 27 in operative association with the drum. The free end of the arm 27 lies in the path of a series of lugs 28 on the drum which by engagement with the arm elevate the arm 25 and, by way of pin 24, the pawl 4. The extent to which the pawl is elevated is a function of the height of the particular lug 28, and the arm 25 is shaped so that, depending on its position of elevation, the pawl will either be disengaged from the ratchet wheel over its entire working stroke or only over a selected initial part of the stroke.

It will be apparent that the arm 21 or its equivalent is essential to the operation of this device. In this case it, however, functions primarily to hold the pawl 4 off the ratchet wheel during the periods when the drum 1 is to remain stationary and, under actuation by the lugs 15 of the chain 2, to condition the pawl for actuation of the drum under control of the lugs 28 of the latter. When, for example, the end of the arm 27 lies between adjoining lugs 28, and the finger 16 is engaged by one of the chain lugs 15, the pawl 4 will be released for engagement with the ratchet wheel 5 at the beginning of its working stroke. The drum 1 will then be rotated to the maximum extent. If, on the other hand, retraction of arm 21 occurs when the arm 27 engages one of the lugs 28, the pawl will be held by arm 25 out of engagement with the ratchet wheel over a predetermined initial part of its working stroke, depending on the height of the lug, and the angular displacement of the drum will be correspondingly curtailed. Since the lugs 15 now serve the single purpose of fully retracting the arm 21, they may be all of the same height. Also, since the function of pawl stroke control is now removed from the arm 21 the matter of frictional wear at the edge 22 is no longer a critical consideration, and wear on the elements 24, 25, 26, 27 and 28 can be limited and controlled by employment of

extended bearing surfaces. It will be apparent that the dimensional limitations of the pattern chain 2 and the prior pawl control elements are not present in the drum 1 and the associated control elements.

I claim:

1. A circular knitting machine comprising a pattern drum for governing predetermined operations of the machine, means for indexing said drum including a ratchet wheel connected to the drum, an actuating pawl for said wheel, and means for continuously oscillating the pawl over a path of predetermined length, means for supporting the pawl in inoperative position with respect to said wheel so that the oscillations of the pawl are ineffective to index the drum, a pattern chain having means to retract the pawl supporting means to free the pawl for operation of the ratchet wheel and drum, means for guiding the pawl in its working stroke into engagement with the ratchet wheel, said guide means being adjustable to vary the point in said stroke at which said engagement occurs, and means on the drum for adjusting the guide means to regulate the effective length of the stroke and the accompanying indexing movement of the drum.

2. A circular knitting machine comprising a pattern drum for governing predetermined operations of the machine, mechanism for indexing the drum, adjustable means for regulating the operations of said indexing mechanism to vary the extent of the individual indexing movements of the drum, means on the drum for predeterminedly adjusting said regulating means, a pattern chain, and means controlled by said chain for initiating and interrupting the operations of the indexing mechanism.

3. A circular knitting machine comprising a pattern drum for governing predetermined operations of the machine, means for indexing said drum including a ratchet wheel connected to the drum, an actuating pawl for said wheel, and means for oscillating the pawl over a path of predetermined length, guide means for said pawl adjustable to withhold the pawl from engagement with the ratchet wheel over selective different initial portions of the working stroke of the pawl to thereby selectively regulate the resulting angular movements of the drum, means on said drum for variably adjusting said guide means, means for elevating the pawl to an inoperative position with respect to the ratchet wheel, and pattern means movable independently of the drum for actuating said elevating means to adjust the pawl selectively to the operative and inoperative positions.

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